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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,101	04/08/2004	Risto Komulainen	1503-0164PUS1	8356

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EXAMINER

BEHM, HARRY RAYMOND

ART UNIT	PAPER NUMBER
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2838

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

acc.

Office Action Summary	Application No.	Applicant(s)	
	10/820,101	KOMULAINEN, RISTO	
	Examiner	Art Unit	
	Harry Behm	2838	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/8/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
3. The following title is suggested: Control of the mains bridge of a frequency converter to regenerate energy from the motor to the supply.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Harada (US 5,491,392).
6. With respect to Claim 1, Harada discloses a method for controlling the mains bridge (Fig. 2 2) of a four-quadrant PWM frequency converter (Fig. 2) provided with a DC intermediate circuit (Fig. 2 C) when the power is flowing in the direction towards the supply network (Fig. 2 11), said frequency converter being provided with an AC inductor (Fig. 2 L) to be connected to an alternating voltage source (Fig. 2 11), a controlled mains bridge (Fig. 2 2), a DC intermediate circuit (Fig. 2 C) and a controlled load bridge (Fig. 2 3) for feeding a variable-frequency alternating voltage into a load (Fig. 2 M), and said mains bridge being provided with controlled semiconductor switches (Fig. 2 Tr1-Tr6) and shunt diodes (Fig. 2 D1-D6), and wherein the mains bridge (Fig. 2 2) is mainly controlled in such manner that the controlled semiconductor switch (Fig. 2 Tr1) in the upper branch of the phase (Fig. 4 R) having the highest supply voltage (Fig. 4 R at t44) instantaneous value and the controlled semiconductor switch (Fig. 2 Tr4) in the lower branch of the phase (Fig. 4 S) having the lowest supply voltage (Fig. 4 S at t44) instantaneous value are conducting, characterized in that the control of the mains bridge semiconductor switch to be conducting next (Fig. 4 R) is advanced by a time (Fig. 4 t44-t43) sufficient to cause the current (Fig. 9 IT) of the conducting phase (Fig. 4 T) to turn from negative to positive before commutation (Fig. 9 t91).

7. With respect to Claim 4, Harada discloses a four-quadrant PWM frequency converter (Fig. 1) having a mains bridge (Fig. 2 2), said mains bridge (Fig. 2 2) being controllable by means of a control unit (Fig. 1 5) in such manner that power flows in the direction towards the supply network (Fig. 2 11), said frequency converter being provided with an AC inductor (Fig. 2 L) to be connected to an alternating voltage source (Fig. 2 11), a controlled mains bridge (Fig. 2 2), a DC intermediate circuit (Fig. 2 C) and a controlled load bridge (Fig. 2 3) for feeding a variable-frequency alternating voltage into a load (Fig. 2 M), and said mains bridge being provided with controlled semiconductor switches (Fig. 2 Tr1-Tr6) and shunt diodes (Fig. 2 D1-D6), and wherein the mains bridge (Fig. 2 2) is mainly controlled in such manner that the controlled semiconductor switch (Fig. 2 Tr1) in the upper branch of the phase (Fig. 4 R) having the highest supply voltage (Fig. 4 R at t44) instantaneous value and the controlled semiconductor switch (Fig. 2 Tr4) in the lower branch of the phase (Fig. 4 S) having the lowest supply voltage (Fig. 4 S at t44) instantaneous value are conducting, characterized in that the control of the mains bridge semiconductor switch to be conducting next (Fig. 4 R) is advanced by a time (Fig. 4 t44-t43) sufficient to cause the current (Fig. 9 IT) of the conducting phase (Fig. 4 T) to turn from negative to positive before commutation (Fig. 9 t91).
8. With respect to Claims 2 and 5, Harada discloses a method as above in a frequency converter in which the mains bridge semiconductor switches are gate turn-off components (paragraph 38 "transistors"), such as IGBTs, characterized

in that the control of the switch to be conducting next is advanced by at least a time step T1 (paragraph 38 "predetermined timing"). Harada does not disclose the equation used, but the predetermined timing performs the same function in the same way with the same result as time step T1.

Claim Rejections - 35 USC § 103

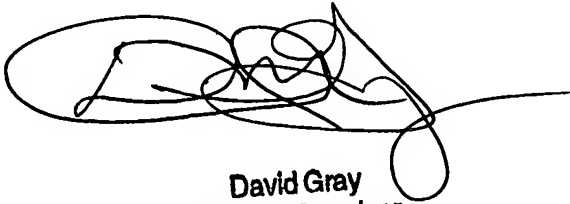
9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada in view of Fujioka (US 4,928,052).
11. Harada discloses a method according to claim 1 in a frequency converter in which the semiconductor switches in the mains bridge are transistors, characterized in that the control of the switch to be conducting next is advanced by at least a time step T2 (paragraph 38 "predetermined timing"). Harada does not disclose that the switches need to be thyristors. Hammond teaches that it is has been common for a long time to use thyristors in the mains bridge. It would have been obvious to one of ordinary skill in the art at the time of the invention to construct a mains bridge with thyristors. The reason for doing so is they are inexpensive and reliable.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hammond (US 6,166,513) teaches a bridge circuit capable of regenerating energy to the supply, composed of IGBT's.
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Behm whose telephone number is 571-272-8929. The examiner can normally be reached on Business EST.
14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Gray can be reached on 571-272-2119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.
15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David Gray
Primary Examiner
